

What is claimed is:

- 1 1. A method comprising steps of:
 - 2 establishing a bi-directional traffic trunk; and
 - 3 performing a loopback function on the established bi-directional traffic trunk.
- 1 2. The method of claim 1, further comprising a step of:
 - 2 evaluating at least one parameter of the established bi-directional traffic trunk
 - 3 using the performed loopback function.
- 1 3. The method of claim 2, further comprising a step of:
 - 2 activating the established bi-directional traffic trunk, when the evaluated
 - 3 parameter is any one of: (1) equivalent to a predetermined standard associated with the
 - 4 evaluated parameter and (2) exceeds the predetermined standard associated with the
 - 5 evaluated parameter.
- 1 4. The method of claim 3, further comprising a step of:
 - 2 performing at least one of: (1) re-establishing the bi-directional traffic trunk using
 - 3 a different explicit route and (2) providing notification, when the evaluated parameter is
 - 4 not equivalent to, and does not exceed the predetermined standard.
- 1 5. The method of claim 2, further including a step of:
 - 2 deactivating the loopback procedure, when the evaluated parameter is any one of:
 - 3 (1) equivalent to a predetermined standard associated with the evaluated parameter and
 - 4 (2) exceeds the predetermined standard associated with the evaluated parameter.
- 1 6. The method of claim 2, wherein the evaluated parameter includes at least one of:
 - 2 connectivity and delay.

- 1 7. The method of claim 3, further comprising steps of:
2 performing the loopback function for the activated bi-directional traffic trunk; and
3 evaluating at least one parameter for the activated bi-directional traffic trunk
4 using the performed loopback function.
- 1 8. The method of claim 7, wherein the loopback function for the activated bi-directional
2 traffic trunk is performed periodically, and the evaluated parameter for the activated bi-
3 directional traffic trunk is evaluated periodically.
- 1 9. The method of claim 8, further comprising steps of:
2 performing at least one of: (1) re-establishing the bi-directional traffic trunk using
3 a different explicit route and (2) providing notification, when the evaluated parameter for
4 the activated bi-directional trunk is not equivalent to, and does not exceed a
5 predetermined standard associated with the evaluated standard.
- 1 10. The method of claim 9, wherein the parameter evaluated for the activated bi-directional
2 traffic trunk includes at least one of connectivity and delay.
- 1 11. The method of claim 1, further including steps of:
2 selecting a label switching router in a path traversed by the bi-directional traffic
3 trunk; and
4 activating a loopback procedure at the label switching router.
- 1 12. The method of claim 11, wherein the step of activating a loopback procedure at a label
2 switching router further includes a step of:
3 transmitting an in-band network management packet that contains a command for
4 activating the loopback procedure.

- 1 13. The method of claim 11, wherein the step of activating a loopback procedure at a label
2 switching router further includes a step of:
3 transmitting an out-of-band command to the label-switching router instructing the
4 label switching router to activate the loopback procedure.
- 1 14. The method of claim 2, wherein the evaluated parameter is evaluated for at least one
2 portion of the established bi-directional traffic trunk.
- 1 15. The method of claim 1, wherein the bi-directional traffic trunk is established in a multi-
2 protocol label switching network.
- 1 16. A method comprising steps of:
2 activating a bi-directional traffic trunk; and
3 performing a loopback function on the activated bi-directional traffic trunk.
- 1 17. The method of claim 16, further comprising a step of:
2 evaluating at least one parameter of the established bi-directional traffic trunk
3 using the performed loopback function.
- 1 18. The method of claim 17, wherein the loopback function for the activated bi-directional
2 traffic trunk is performed periodically, and the evaluated parameter for the activated bi-
3 directional traffic trunk is evaluated periodically.
- 1 19. The method of claim 17, further comprising steps of:
2 performing at least one of : (1) re-establishing the bi-directional traffic trunk using
3 a different explicit route and (2) providing notification, when the evaluated parameter for
4 the activated bi-directional traffic trunk is not equivalent to and does not exceed a
5 predetermined standard associated with the evaluated parameter.

1 20. The method of claim 16, wherein the activated bi-directional traffic trunk is in a multi-
2 protocol label switching network.

1 21. The method of claim 17, wherein the at least one parameter includes at least one of
2 connectivity, delay and other quality of service parameters.

1 22. A network comprising:

2 an originating router configured to transmit a packet downstream on a bi-
3 directional traffic trunk; and

4 a loopback router configured to receive the packet and transmit the packet
5 upstream towards the originating router on the bi-directional traffic trunk.

1 23. The network of claim 22, wherein the originating router receives the packet from the
2 loopback router and evaluates at least one parameter of the bi-directional traffic trunk
3 using the packet.

1 24. The network of claim 23, wherein the bi-directional traffic trunk is not carrying user
2 traffic.

1 25. The network of claim 24, wherein the originating router performs at least one of: (1) re-
2 establishing the bi-directional traffic trunk using a different explicit route and (2)
3 providing notification, when the evaluated parameter is not equivalent to and does not
4 exceed a predetermined standard associated with the evaluated parameter.

1 26. The network of claim 24, wherein the originating router activates the established bi-
2 directional traffic trunk when the evaluated parameter is any one of : (1) equivalent to a
3 predetermined standard associated with the evaluated parameter and (2) exceeds a
4 predetermined standard associated with the evaluated parameter.

002090"19458560

- 1 27. The network of claim 24, wherein the parameter is evaluated for at least one portion of
2 the bi-directional traffic trunk.
- 1 28. The network of claim 23, wherein the bi-directional traffic trunk is activated.
- 1 29. The network of claim 28, wherein the originating router performs at least one of (1) re-
2 establishing the bi-directional traffic trunk using a different explicit route and (2)
3 providing notification, when the evaluated parameter for the activated bi-directional
4 traffic trunk is not equivalent to and does not exceed a predetermined standard associated
5 with the evaluated parameter.
- 1 30. The network of claim 23, wherein the at least one parameter includes at least one of
2 connectivity and delay.
- 1 31. The network of claim 22, wherein the originating router is a label edge router.
- 1 32. The network of claim 22, wherein the loopback router is at least one of a label edge
2 router and an intermediate label switching router.
- 1 33. The network of claim 22, wherein the packet is an in-band network management packet.
- 1 34. The network of claim 22, wherein the bi-directional traffic trunk is in a multi-protocol
2 label switching network.
- 1 35. A method comprising steps of:
2 receiving a packet travelling downstream on a bi-directional traffic trunk; and
3 transmitting the received packet upstream on the bi-directional traffic trunk.
- 1 36. The method of claim 35, further comprising a step of identifying the incoming label of
2 the received packet.

1 37. The method of claim 36, further comprising a step of replacing the identified incoming
2 label with an incoming label corresponding to a received packet travelling upstream on
3 the bi-directional traffic trunk.

1 38. The method of claim 37, further comprising steps of:
2 maintaining a table of next hop label forwarding entries; and
3 determining the received packet's next hop using a next hop label forwarding
4 entry associated with the replaced incoming label.

1 39. The method of claim 35, further comprising a step of determining the received packet's
2 next hop using a loopback label forwarding entry.

1 40. The method of claim 39, further comprising a step of maintaining a table of loopback
2 label forwarding entries.

1 41. The method of claim 40, wherein the step of maintaining a table further includes a step of
2 maintaining the table of loopback label forwarding entries for the duration the loopback
3 procedure is activated

1 42. The method of claim 35, wherein the step of receiving a packet further includes
2 receiving the packet at a label switching router, and the receiving label switching router is
3 any one of a label edge router and an intermediate label switching router.

1 43. The method of claim 42, further including a step of determining whether the label
2 switching router receiving the packet is a loopback label switching router for the received
3 packet.

1 44. The method of claim 35, further including a step of:
2 determining whether the received packet is a loopback in-band network management
3 packet.

- 1 45. The method of claim 35, wherein the bi-directional traffic trunk is in a multi-protocol
2 label switching network.
- 1—46. A router comprising:
2 a plurality of ports, one port of the plurality of ports receiving a packet travelling
3 downstream on a bi-directional traffic trunk; and
4 processing circuitry processing the packet and forwarding the packet to a selected
5 port of the plurality of ports for transmission to a next hop upstream on the bi-directional
6 traffic trunk.
- 1 47. The router of claim 46, wherein the processing circuitry identifies an incoming label for
2 the received packet and replaces the identified incoming label with an incoming label
3 corresponding to a received packet travelling upstream on the bi-directional traffic trunk.
- 1 48. The router of claim 47, wherein the processing circuitry includes a memory that stores
2 routing information, and the processing circuitry determines the next hop upstream using
3 the stored routing information associated with the replaced label.
- 1 49. The router of claim 48, wherein the routing information is next hop label forwarding
2 entries.
- 1 50. The router of claim 46, wherein the processing circuitry includes a memory that stores
2 loopback label forwarding entries.
- 1 51. The router of claim 50, wherein the processing circuitry identifies an incoming label for
2 the received packet and determines the next hop upstream using a stored loopback label
3 forwarding entry associated with the identified incoming label.
- 1 52. The router of claim 46, wherein the router is a label switching router in a multi-protocol
2 label switching network.

002090-49468560

- 1 53. The router of claim 52, wherein the processing circuitry determines whether the received
2 packet is a loopback in-band network management packet.
- 1 54. The router of claim 53, wherein the processing circuitry determines whether the label
2 switching router is a loopback label switching router for the received loopback in-band
3 network management packet.
- 1 55. A method comprising steps of:
2 constructing a packet at a router;
3 transmitting the packet downstream on a bi-directional traffic trunk from the
4 router constructing the packet;
5 receiving the packet at a router; and
6 determining whether to perform a loopback procedure at the router receiving the
7 packet.
- 1 56. The method of claim 55, further comprising a step of:
2 identifying the received packet as a loopback packet.
- 1 57. The method of claim 56, further comprising a step of:
2 processing the received packet in accordance with a command in the packet, when
3 the packet is determined to be a loopback packet.
- 1 58. The method of claim 57, wherein the command is associated with at least one parameter
2 of the bi-directional traffic trunk.
- 1 59. The method of claim 58, wherein the at least one parameter includes at least one of
2 connectivity, delay, and other quality of service parameters.

002090-1948560

- 1 60. The method of claim 55, wherein the router constructing the packet and the router
2 receiving the packet are label switching routers.
- 1 61. The method of claim 60, wherein the router constructing the packet is an edge router and
2 the router receiving the packet is any one of an edge router and an intermediate router.
- 1 62. The method of claim 60, wherein the routers are in a multi-protocol label switching
2 network.
- 1 63. The method of claim 55, wherein the step of determining whether to perform a loopback
2 procedure further includes a step of determining whether the received packet is a
3 loopback packet.
- 1 64. The method of claim 63, wherein the step of determining whether to perform a loopback
2 procedure further includes a step of determining whether the router receiving the packet
3 is a loopback router for the received packet.
- 1 65. The method of claim 64, further comprising a step of:
2 performing the loopback procedure at the label switching router receiving the
3 packet when the received packet is a loopback packet and the router receiving the packet
4 is the loopback router for the received packet.
- 1 66. The method of claim 65, further comprising a step of:
2 transmitting the received packet to a next hop upstream on the bi-directional
3 traffic trunk, towards the router constructing the packet, after performing the loopback
4 procedure.

- 1 67. The method of claim 63, further comprising a step of:
2 transmitting the received packet to a next hop downstream on the bi-directional
3 traffic trunk when the received packet is not a loopback packet.
- 1 68. The method of claim 64, further comprising a step of:
2 transmitting the received packet to a next hop downstream on the bi-directional
3 traffic trunk when the router receiving the packet is not the loopback router for the
4 received packet.
- 1 69. A network comprising:
2 a bi-directional traffic trunk;
3 an originating router constructing a packet and transmitting a packet downstream
4 on the bi-directional traffic trunk; and
5 a receiving router receiving the packet and determining whether the receiving
6 router is a loopback router for the received packet.
- 1 70. The network of claim 69, wherein the receiving router performs a loopback procedure
2 when the receiving router is the loopback router for the received packet.
- 1 71. The network of claim 70, wherein the receiving router processes the received packet in
2 accordance with a command in the packet.
- 1 72. The network of claim 71, wherein the command is associated with at least one parameter
2 of the bi-directional traffic trunk.
- 1 73. The network of claim 72, wherein the at least one parameter includes at least one of
2 connectivity, delay, and other quality of service parameters.

1 74. The network of claim 70, wherein the receiving router transmits the received packet to a
2 next hop upstream, towards the originating router, when the receiving router is the
3 loopback router for the received packet.

1 75. The network of claim 69, wherein the receiving router transmits the received packet to a
2 next hop downstream on the bi-directional traffic trunk when the receiving router is not
3 the loopback router for the received packet.

1 76. The network of claim 69, wherein the originating router and the receiving routers are
2 label switching routers.

1 77. The network of claim 76, wherein the originating label switching router is an edge router
2 and the receiving router is any one of an edge router and an intermediate router.

1 78. The network of claim 69, wherein the bi-directional traffic trunk is in a multi-protocol
2 label switching network.

1 79. The network of claim 69, wherein the packet is an in-band network management packet.

002090-1248560
09589464-060700